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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/550,598 | 04/17/2000 | Hisashi Ohtani | 0756-2119 | 1223 |
| 31780 | 7590 | 05/18/2004 | | |
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| | | | ART UNIT 2814 | PAPER NUMBER |

DATE MAILED: 05/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/550,598

Applicant(s)

OHTANI ET AL.

Examiner

Phat X. Cao

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-- **Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --**
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,5,7,9,11,12,14,18 and 20-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,7,9,11,12,14,18 and 20-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>2/13/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The cancellation of claims 3, 6, 8, 10 and 15 in Paper filed 1/26/04 is acknowledged.

Claim Rejections - 35 USC § 103

1. **The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:**

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 5, 7, 9, 14, 18, and 20-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al (US. 5,706,064) in view of Liu et al (US. 5,536,950) and Izumi (US. 6,400,428).

With respect to claims 1, 5, 7, 9, 18, and 27-29, Fukunaga (Figs. 24A - 24G) discloses a method for producing a semiconductor device having an active matrix display device, comprising: forming a first conductive layer 405; forming an insulating layer (413,414) over the first conductive layer; forming an opening in the insulating layer to expose the first conductive layer 405 at a bottom of the opening; forming an embedded conductive layer 418 to cover the insulating layer and the opening (Fig. 24E); etching the embedded conductive layer 418 (Fig. 24F); and forming a second conductive layer on the insulating layer and the embedded conductive layer; and forming a pixel electrode 412 by patterning the second conductive layer (column 26, lines 46-48); wherein the embedded conductive layer 418 or 411b comprises an organic resin film made of polymer (column 26, lines 54-61) or carbon (column 20, lines 36-48) which is the same resin as the resin of the interlayer insulating film (column 19, lines 27-

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35 and column 20, lines 31-57), and wherein the embedded conductive layer 418 or 411b is further made of inorganic oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3).

Fukunaga does not disclose the embedded conductive layer 418 is etched to expose a portion of the insulating layer.

However, Liu (Fig. 4G) teaches the steps of depositing the embedded conductive layer 82 in the opening, followed by planarization to expose the surface of the insulating layer 78 and depositing and patterning the pixel electrode 24 on the embedded conductive layer 82 (column 5, lines 30-39). Accordingly, it would have been obvious to etch or polish the embedded conductive layer 418 of Fukunaga to expose a portion of the insulating layer in order to provide a unique body tie arrangement for achieving a compact and high reliability display, as taught by Liu (column 2, lines 57-67 through column 3, lines 1-12). Furthermore, it also would have been obvious to form Fukunaga's pixel electrode being either a transparent electrically conductive film or a reflective electrically conductive film depending upon the display device type which is desired for the liquid crystal display device, as taught by Izumi (column 6, lines 15-20).

With respect to claim 14, etching or polishing the embedded conductive layer 418 of Fukunaga by chemical mechanical polishing would have been obvious because it is well known in the art for planarizing the embedded conductive lug.

With respect to claims 20-26, Fukunaga also teaches (column 1, lines 5-30) that because the liquid crystal display device has high image quality and can be used as switching elements, this kind of display device has been widely used as a display device in a personal computer, television or the like. Accordingly, it would have been obvious to apply the display device of Fukunaga to a cellular phone, a camcorder, etc., because it is an intended use.

3. Claims 2 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al in view of Liu et al, Izumi and Kobayashi et al (US, 6,221,140).

As discussed in details above, the combination of Fukunaga, Liu and Izumi substantially reads on claims 2 and 11, except it does not disclose the embedded oxide conductive layer is formed by a spin coating method.

However, Kobayashi (column 2, lines 34-48) teaches the forming of an oxide conductive layer by a spin coating method to cover the substrate and the opening. Accordingly, it would have been obvious to form the embedded oxide conductive layer 418 (Fig. 24E) of Fukunaga with the method of spin coating because according to Kobayashi, such method is known for reducing in manufacturing cost (column 2, lines 24-33).

4. Claims 4 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukunaga et al in view of Izumi, Jun (US. 5,948,705) and Kobayashi et al (US. 6,221,140).

Fukunaga (Figs. 24A - 24G) discloses a method for producing a semiconductor device having an active matrix display device, comprising: forming a first conductive layer 405; forming an insulating layer 413 over the first conductive layer; forming an opening in the insulating layer to expose the first conductive layer at a bottom of the opening; forming an oxide conductive layer of ITO or ZnO (column 30, lines 43-46 and column 5, lines 66-67 through column 6, lines 1-3) to cover the insulating layer and the opening; forming a second conductive layer 412 on the oxide conductive layer; and patterning the second conductive layer to form a pixel electrode. It is noted that forming pixel electrode being either a transparent film or a reflective film would be obvious

because it depends on the display device which is desired for the liquid crystal display device (see Izumi, column 6, lines 15-20).

Fukunaga does not disclose the step of etching the oxide conductive layer by using the second conductive layer as a mask.

However, Jun ('705) teaches a step of etching the embedded conductive layer 46' by using the second conductive layer 48 as a mask in a self-alignment manner (Figs. 4D - 4E and column 7, lines 25-30). Accordingly, it would have been obvious to modify the process of Fukunaga by forming the step of etching the embedded conductive layer 418 with the process as set forth above in order to prevent deterioration of the step coverage in the contact hole and the recess formation in the contact hole, as taught by Jun ('705) (column 7, lines 35-44).

Furthermore, in view of teachings of Kobayashi (column 2, lines 34-48), it also would have been obvious to form the embedded oxide conductive layer 418 of Fukunaga with the method of spin coating because according to Kobayashi, such method is known for reducing in manufacturing cost (column 2, lines 24-33).

Response to Arguments

5. Applicant argues that it would not obvious to change Fukunaga's device from a transmissive-type LCD to a reflective-type LCD by replacing Fukunaga's transparent pixel electrode with the reflective pixel electrode as suggested by Izumi.

This argument is not persuasive because the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of

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the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this case, the combined teachings of the references would have suggested to those of ordinary skill in the art because Izumi clearly suggests that the display device electrode of Fukunaga can have a pixel electrode made of either a transparent electrically conductive film or a reflective electrically conductive film depending upon the display device type which is desired for the liquid crystal display device (column 6, lines 15-20). Specifically, Izumi states in column 6, lines 14-19 that:

"Each pixel electrode 15 is a transparent electrically conductive film made of ITO (Indium Tin Oxide) or the like when used for a light transmitting type display device and a reflective electrically conductive film made of aluminum (Al) or the like when used for a reflecting type display device."

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is (571) 272-1703. The examiner can normally be reached on Monday - Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PC
May 13, 2004



PHAT X. CAO
PRIMARY EXAMINER